FIFE GUIDING SOLUTIONS

MAXCESS

MAGPOWR FIFE TIDLAND

FIFE DSE-17
Infrared Light Sensor
Operating Instructions

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1 INTRODUCTION

About these operating instructions

These Operating Instructions describe the installation, operation and maintenance of the DSE-17 digital infrared light sensor and provide important instructions for proper use.

These Operating Instructions are directed to both the system construction master as well as the operator who uses the DSE-17 sensor in production. The Operating Instructions must be read and used by all persons who have the responsibility of installing, operating and maintaining the DSE-17 sensor.

The Operating Instructions must be carefully kept and must always be available throughout the service life of the DSE-17 sensor.

Translation of the original Operating Manual:
This Operating Manual is a translation. The original Operating Manual was composed in German.

Proper use

The DSE-17 digital infrared light sensor is used for no-contact measurements of the lateral offset of a material web that is being guided. The DSE-17 sensor is suitable for

- web edge guiding and
- web center guiding

The DSE-17 sensor can be used to control both opaque and transparent materials.

The DSE-17 sensor must only be used in accordance with its intended purpose and in a technically flawless conditions.

The DSE-17 sensor must not be changed or opened. The protection panes are fastened with a special adhesive.

Air supply (optional)

The DSE-17 sensor is also available with air supply. Depending on the type of dirt contamination, this makes it possible to keep the protection panes, which cover transmitter and receiver, free of large pieces of dirt with a continuous or pulsing flow of air.

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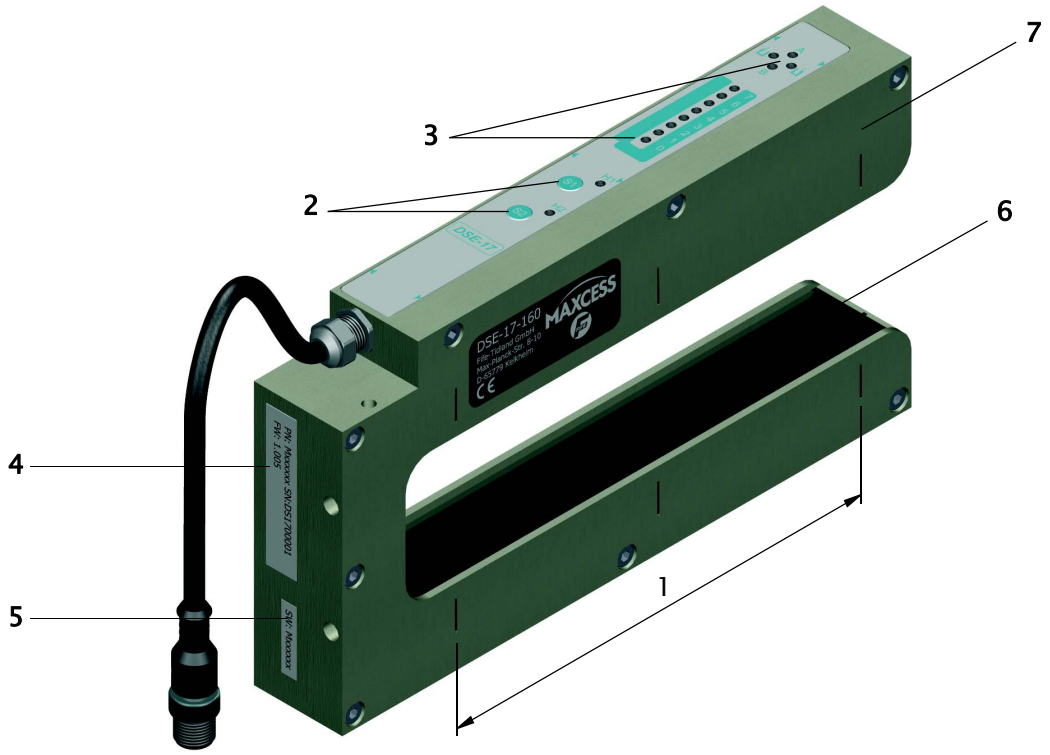
Depending on the degree of dirt contamination and the installation location, it may be necessary to vary the air pressure. The air must be clean and oil-free (see *Air supply (optional), page 9-3*).

Improper use

- Operation outside of the technical specifications is not permitted.
- Operation in areas where there is a danger of explosions is prohibited.
- Any use other than the designated use is not permitted.

Mode of functioning

The DSE-17 sensor works with infrared light. Because of this the sensor is relatively insensitive to visible light.



1 Sensor field of view (proportional band)
2 Control elements
3 Displays
4 Part, serial and firmware numbers
5 Configuration number
6 Protection pane
7 Upper side of the sensor fork

Figure 1.1: DSE-17 digital infrared light sensor

Several measuring cells measure the difference in transparency between the material web and the open field of view. This makes the sensor relatively tolerant to dirt contamination on the sensor and fluctuations in the transparency of the web material.

Depending on how far the material web covers the sensor field of view, a part of the infrared light strikes the receiver. The position of the first edge is determined starting at the closed end of the sensor and the output signal is generated. Additional output signals may be generated for other material web edges located in the field of view. The configuration number (see item 5 in *Figure 1.1*) identifies the user-specific assignment of the signals. For further information refer to the configuration drawing in the system documentation.

2 SAFETY INSTRUCTIONS

Important information

To ensure safe and problem-free operation of the DSE-17 sensor it must be

- properly shipped and stored,
- properly mounted and placed in operation,
- properly used and carefully maintained.

Proper operation and careful maintenance will ensure a long service life for the sensor.

Only persons who are acquainted with the installation, commissioning, operation and maintenance of the sensor and who possess the necessary qualifications for their activities may work on the DSE-17 sensor.

Please note the following:

- The content of these operating instructions
- The safety instructions printed on the unit
- The requirements of the machine manufacturer
- National, state and local requirements for accident prevention and environmental protection

Information about safety instructions

The safety instructions and symbols described in this section are used in these Operating instructions. They are used to avoid possible dangers for users and to prevent material damage.

SIGNAL WORD
Source of danger and its results.

⇨ Avoiding dangers

The signal word **WARNING** refers to the danger of moderate to sever bodily injuries.

The signal word **CAUTION** refers to the danger of slight to moderate bodily injuries or material damage.

Symbols

Warning/caution - dangerous area
Reference to general hazards that may result in bodily injuries or damage to the device

Warning/caution - danger due to crushing
Refers to danger of injury caused by crushing

Warning/caution - danger due to cutting
Refers to danger of injury caused by cutting

Additional symbols

- This endash is followed by an enumeration.
- This dot is followed by a prompt to do something.

Note:
Reference to important information.

Preventing hazards

- The DSE-17 sensor may not be used as a support, handle or step. There is a danger that the sensor will become damaged (breaking off/snapping), resulting in personal injury.

Installation and commissioning

- A damaged sensor must not be installed or placed in operation.
- Assembly work must be performed while the machine is stopped and protected against being turned on again.
- All assembly tasks must only be performed when there is no electrical power in the system.
- The sensor must not be placed in operation unless it has been securely mounted.
- Electrical connections should always be made or disconnected on the sensor while there is no electrical power in the system. Failure to observe these instruction may result in damage to the sensor.

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- The parameters specified in Section *Technical data* must be observed.
- Only accessory and replacement parts that have been approved by Fife-Tidland GmbH may be used.
- No changes must be made to the sensor.
- Electrical lines must not be subjected to any mechanical loads.

Operation

- Danger of injury by crushing
  ⇨ Do not place your hands on or near moving parts (rollers, material web, etc.) during operation.

- Danger of injury due to cutting on the edge of the material web
  ⇨ Do not place your hands on the edge of the (moving) material web during operation.

Maintenance

- Danger of injury by crushing
  ⇨ Maintenance work must only be performed on the sensor when the power is turned off and the machine is stopped and protected against being turned on again.

3 INSTALLATION

Transport and storage

- The sensor and/or the unit on which the sensor is mounted must be secured against slipping during transport.
- The sensor must be stored in a cool, dry place.
- The sensor must not be stored in the vicinity of powerful magnetic fields. The electronic components of the sensor may be damaged.

Included with delivery

- Sensor DSE-17
  The model designation, part number, and the firmware and configuration numbers are on the nameplates on the housing.
- Operating instructions

Mounting

WARNING

⇨ All assembly tasks on the sensor must be performed when there is no electrical power in the system.

⇨ Assembly tasks and mechanical settings must only be performed when the machine has been stopped and has been secured from being turned on again.

Mounting location

- Protection Class: IP65
- Operating temperature: 10°C ... 60°C
- Relative humidity: up to 90% non-condensing
- Operating altitude: 3000m
- Protect from vibrations
- Not in the vicinity of strong magnetic fields
  The electronic components may be damaged.
- Not in places where there is a risk of explosions.

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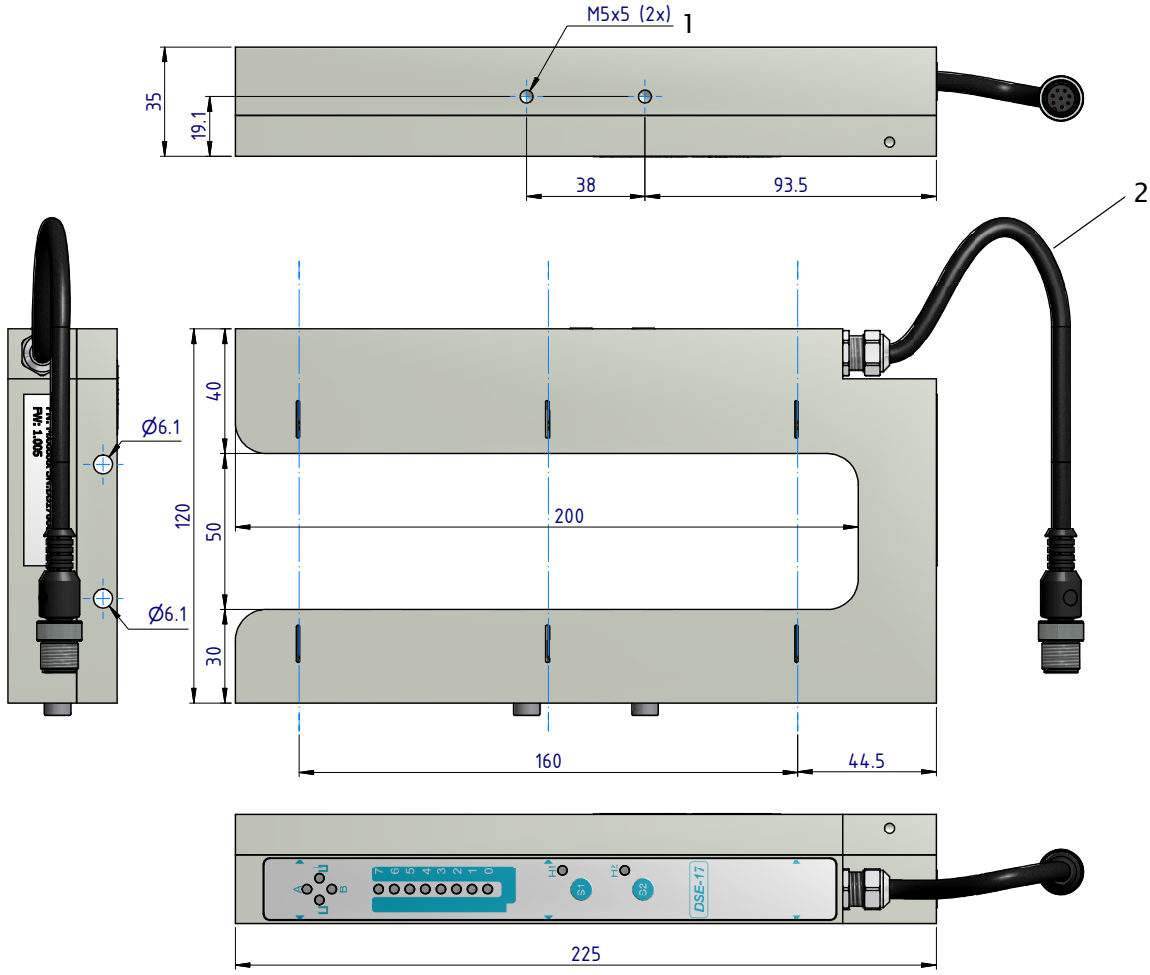
Dimensions



1 Thread for fastening
2 Length of connection cable about 140 mm

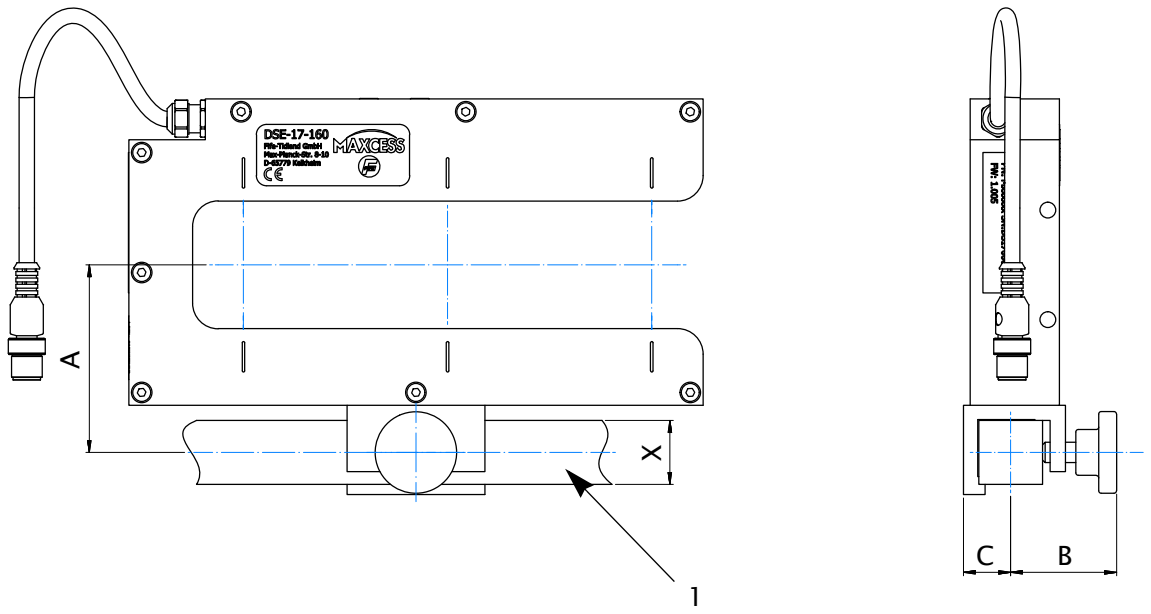
Figure 3.1: Dimensions of DSE-17-160

Mechanical fastening

Holes with M5 threads are available on the housing for mounting the DSE-17 sensor (*Figure 3.1*).

Table 3.1: Sensor bracket type MB (*Figure 3.2*)

Mechanical fastening	Square bar		A	B	C
	X	Max. length			
MB-20	20	1600	70,5	ca. 43	15
MB-25	25	2200	73,5	ca. 47	19
MB-32	32	2400	78,5	ca. 52	24



1 Square bar

Figure 3.2: DSE-17 with sensor bracket of type MB

Electrical connection

CAUTION:
The sensor could be damaged.

⇨ Electrical connections should always be made or disconnected on the sensor while there is no electrical power in the system.

The sensor must be connected to the web guide controller according to the system diagram in the system documentation.

Normally the sensor must be connected to the web guide controller with a cable on the corresponding sensor input. In some cases the sensor can be connected via a Y-cable or an external distributor box to two sensor inputs on the web guide controller.

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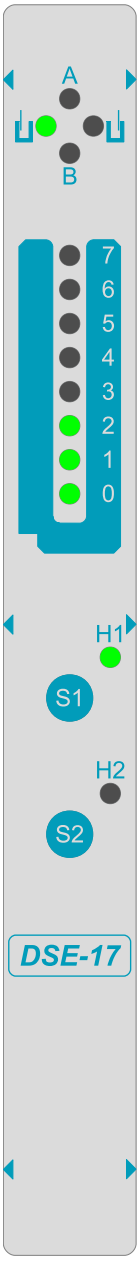
4 CONTROL ELEMENTS

Control elements



The DSE-17 sensor has the following control and display elements.

LEDs ⌊ and ⌋:

- The LEDs identify the position of the material that is being tracked in terms of the upper ⌊ and lower ⌋ sensor sides.

Note:
When the material web is in the center of the sensor fork, LEDs ⌊ and ⌋ are not lit.

LEDs A and B:

- Not assigned

LED bar graph:

- Shows the tracked edges of the material web when the sensor is working in the regular operation state.

S1 key:

- Generate auxiliary signals for calibrating the connected web guide controller

S2 key:

- Perform calibration of the sensor

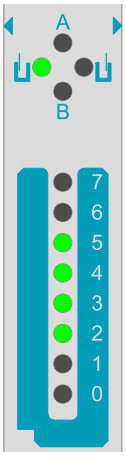
LED H1:

- LED H1 is continuously lit when the sensor is turned on and working in its regular operation state.
- LED H1 flashes while it is generating auxiliary signals for calibrating the connected web guide controller.

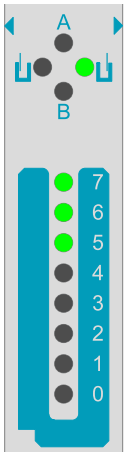
LED H2:

- LED H2 is turned off in its regular operation state.
- LED H2 flashes while the sensor is being calibrated.
- LED H2 flashes in a certain pattern. The sensor is indicating an error (see *table, page 8-1*).

Examples



Example 1



Example 2

Example 1:

- The sensor detects two material web edges.
- The material web is located in the center of the sensor field of view.
- The material web is located closer to the upper sensor side ⊔.

Example 2:

- The sensor detects one material web edge.
- The material web covers the outer part (3/8) of the sensor field of view.
- The material web is located closer to the lower sensor side ⊔.

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5 COMMISSIONING

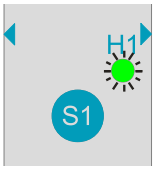
Calibrating the sensor inputs of the web guide controller

When the DSE-17 sensor is connected to the web guide controller for the first time, the selected sensor input of the web guide controller must be calibrated to the output signals of the DSE-17. This ensures that the web guide controller and sensor use the same standard of evaluation. This process must be performed for each signal of the sensor (for example the edge signal or dirt contamination signal). For the assignment of sensor signals to inputs of the web guide controllers, see the configuration drawing for the DSE-17 in the system documentation.

Note:
If no key is pressed for more than 2 minutes the sensor returns to its regular operation state.

Calibration

- Press S1 and hold it for 3 seconds

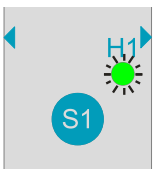


LED H1 flashes (short on - long off)
Depending on the configuration, the analog outputs of the sensor return 0 mA or 4 mA.

- Calibrate the web guide controller to the lower reference value (sensor uncovered)

Note:
For further information see the Operating Instructions for the web guide controller in the system documentation.
DP-20, DP-30: Menu 3x.1.4 Calibration for edge sensors
D-MAX: Menu 1y.5.1.1.1 Calibration
FIFE 500: Sensor setup menu

- Press the S1 key briefly to continue with the calibration of the upper reference value.



LED H1 flashes (long on - short off)
Depending on the configuration, the analog outputs of the sensor return 10 mA or 20 mA.

- Calibrate the web guide controller to the upper reference value (sensor covered)

- Press the S1 key briefly to return to calibration of the lower reference value.
  The next sensor signal can be calibrated.

  or

  Press the S1 key and hold it for 3 seconds to return to the regular operation state

Calibrating sensor DSE-17

The sensor is normally in a calibrated state upon delivery. Due to certain circumstances such as changes in environmental conditions or wear tracks on the protection panes of the sensor, it may become necessary to recalibrate the sensor.

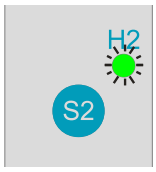
Note:
If no key is pressed for more than 2 minutes the sensor returns to its regular operation state. No calibration data will be saved.

Precondition:

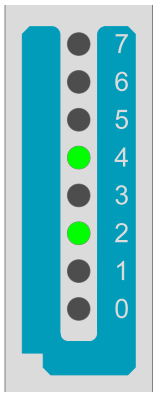
- There must not be any material in the sensor field of view.
- The protection panes of the sensor must be clean.

Calibration

- Press the S2 key and hold it for 5 seconds



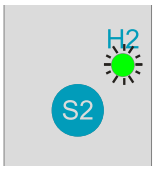
LED H2 flashes (long on – short off)
The brightness values of the sensor are calibrated.



The bar graph represents the minimum and maximum level of brightness values.

- Press the S2 key briefly to complete the calibration process:

– If the calibration data is correct it will be saved.
LED H2 is lit for 3 seconds before the sensor returns to its regular operation state.



– If the calibration data is not correct, LED H2 flashes quickly for 10 seconds.
The sensor returns to its regular operation state without saving the data from the calibration.

or

Press the S2 key and hold it for 3 seconds to return to the regular operation state
Calibration data will not be saved.

6 OPERATION

WARNING:
Danger of injury by crushing

⇨ Do not place your hands on or near moving parts (rollers, material web, etc.) during operation.

WARNING:
Danger of injury due to cutting on the edge of the material web

⇨ Do not place your hands on the edge of the (moving) material web during operation.

CAUTION:
Depending on the material of the web that is being guided, it is possible that the web edge could grind against the inside of the sensor fork, resulting in notches and incisions on the sensor. The sensor could become unusable.

No tasks or settings are required for the DSE-17 sensor during operation.

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7 MAINTENANCE

WARNING:
Danger of injury by crushing.

⇨ Maintenance work must only be performed on the sensor when the power is turned off and the machine is stopped and protected against being turned on again.

Maintenance

Cleaning

Ambient dust and dirt must be cleaned from the protection panes at regular intervals using a neutral synthetic cleaning agent and a soft cloth. Make certain the cleaner is suitable for PMMA plastics (see *Protection panes, page 9-1*).

Recalibration of the sensor

If the protection panes begin to show signs of wear, the accuracy of the sensor can be improved by adjusting the brightness values of the sensor to the changed conditions with a new calibration (see *Calibrating sensor DSE-17, page 5-2*).

No other maintenance work is required for the DSE-17 sensor.

Decommissioning

- Turn off the electrical power to the system.
- Disconnect the signal cable from the sensor.
- Unscrew the sensor from its bracket.
- Store the sensor in a cool, clean and dry place.

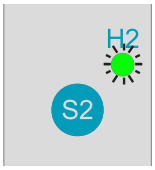
  OR

  Dispose of the sensor according to your national requirements.

8 TROUBLESHOOTING

Error display

LED H2 of the DSE-17 sensor flashes to indicates errors. The flashing patterns identify the error.



When an error occurs, LED H2 flashes n times with a certain pattern for 1 second, followed by a 3-second pause. "n" and the information corresponding to it are described in the table below.

"n"	Error	Remedy
2	No calibration data	Calibrate the sensor again.
3	Hardware error (LED array)	The error should not be remedied by the customer. The sensor must be sent back to Fife-Tidland GmbH for repairs.
4	Temperature sensor faulty	
5	Overtemperature error	The error is set at 75°C and canceled when the temperature falls back to 65°C.

An error is displayed until it has been remedied.

Note:
Error display is suppressed during calibration.

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9 TECHNICAL DATA

General information

Dimensions

see *Figure 3.1, page 3-2*

Weight

900g

Protection class

IP65

Ambient conditions

Ambient temperature: 10°C - 60°C
Relative humidity: up to 90% non-condensing
Operating altitude max. 3000m above sea level

Protection panes

PMMA (polymethylmethacrylate)
A data sheet for this material is available on request.

Optical properties

Light source

Modulated infrared light
Wavelength: 850nm

Sensor field of view

160mm

Number of edges to be evaluated

Maximum 4 edges

Distance of the edges

$>$40mm

Light absorption

Minimum admissible absorption by the material: 40%

Dirt contamination level

Maximum admissible absorption by dirt contamination: 30%

Characteristic values

Linearity:

Measurement error $<\pm 1\%$

Web plane change:

Measurement error < ±0.5%

Temperature

Measurement error < ±0.5% (between 10°C and 50°C)

Electrical connection

Power supply

+10V – +28V

Output signal (depends on configuration)

0 – 10mA or
4 – 20mA

Power consumption

Operating voltage	Configuration	Maximum power consumption
12V	4 x 20mA	150mA
	4 x 10mA	130mA
24V	4 x 20mA	75mA
	4 x 10mA	65mA

Extension cable

Up to 15m (standard)
Up to 40m (optional)

X1 plug connector

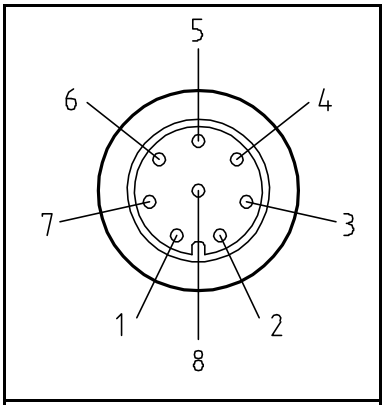

Figure 9.1: M12 connector as seen from the connection side

Normally the sensor must be connected to the web guide controller with a cable on the corresponding sensor input. In some cases the sensor can be connected via a Y-cable or an external distributor box to two sensor inputs on the web guide controller.

Pin on connection cable	Function
1	VCC (+12V)
2	Signal 2
3	GND
4	Signal 1
5	RS485-B
6	RS485-A
7	Signal 3
8	Signal 4

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Use of individual analog signals is configuration-dependent.
The following meanings are possible:

Index	Function
0	Edge 1
1	Edge 2
2	Edge 3
3	Edge 4
4	Edge 1 inverted
5	Edge 2 inverted
6	Edge 3 inverted
7	Edge 4 inverted
8	Web width (edge 1, edge 2)
9	Web width (edge 3, edge 4)
10	Web center (edge 1, edge 2)
11	Web center (edge 3, edge 4)
12	Transparency
13	Dirt contamination
14	Inactive

For information regarding the specific configuration of this sensor, refer to the drawing under the configuration number in the system documentation.

Note:
The configuration of the sensor cannot be changed by the user.

Air supply (optional)

Operating pressure*	Air consumption*
3 bar	7.42 m^3/h
Up to 6 bar pulsing	3.7 l/s

* These figures are approximate values. They can be adjusted to the relevant application if necessary.

Filtration rating

5 µm or better

Residual oil content

0.01 mg / m³ or better

Standards

The DSE-17 sensor has been designed and constructed according to the standards and regulations of the European Union. A declaration of conformity is available on file.

10 SERVICE

Requests for Service

When requesting service, please have a copy of the order confirmation ready with the order number.

When requesting replacement parts, please indicate also the part numbers, drawing numbers, model descriptions and configuration number (see item 5 in *Figure 1.1, page 1-2*).

Please be careful to keep all documents accompanying the product in a safe place. This will allow us to help you more quickly in the event that service is required.

Addresses

To request service, or if you need replacement parts, please contact one of the following addresses.

Fife-Tidland GmbH

Max-Planck-Straße 8-10
65779 Kelkheim
Deutschland

Siemensstraße 13-15
48683 Ahaus
Deutschland

Telefon: +49 - 6195 - 7002 - 0
Fax: +49 - 6195 - 7002 - 933
E-Mail: service@maxcess.eu
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